



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/781,730	02/12/2001	Donald S. Farquhar	EN9-98-122US3	8946

5409 7590 09/28/2004

ARLEN L. OLSEN
SCHMEISER, OLSEN & WATTS
3 LEAR JET LANE
SUITE 201
LATHAM, NY 12110

EXAMINER

GOFF II, JOHN L

ART UNIT	PAPER NUMBER
----------	--------------

1733

DATE MAILED: 09/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/781,730

Applicant(s)

FARQUHAR ET AL.

Examiner

John L. Goff

Art Unit

1733

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 17 June 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 23-25, 32, 33, 35-37, 40, 41, 43, 45, 49 and 51-57 is/are pending in the application.
- 4a) Of the above claim(s) 51-57 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 23-25, 32, 33, 35-37, 40, 41, 43, 45 and 49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 October 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114 was filed in this application after a decision by the Board of Patent Appeals and Interferences, but before the filing of a Notice of Appeal to the Court of Appeals for the Federal Circuit or the commencement of a civil action. Since this application is eligible for continued examination under 37 CFR 1.114 and the fee set forth in 37 CFR 1.17(e) has been timely paid, the appeal has been withdrawn pursuant to 37 CFR 1.114 and prosecution in this application has been reopened pursuant to 37 CFR 1.114. Applicant's submission filed on 6/17/04 has been entered.

Allowable Subject Matter

2. The indicated allowability of previous claim 31 (the limitation of which has been incorporated into independent claim 23) is withdrawn in view of the newly discovered reference(s) to Jones et al. (U.S. Patent 4,697,923). Rejections based on the newly cited reference(s) follow.

Election/Restrictions

3. Newly submitted claims 51-57 are directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Claim 23/Invention I (previously examined) is directed to forming a circuit board by coating and impregnating a fluoropolymer matrix with a thermoset resin having a contrasting dye and laminating, i.e. applying, the

impregnated fluoropolymer matrix to a conductor. Claim 51/Invention II (new) is directed to forming a multilayer circuit board from a plurality of devices of claim 23/invention I such that claim 51/invention II and claim 23/invention I are related as combination and subcombination. Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the combination does not require a contrasting dye. The subcombination has separate utility such as single sided printed circuit board. Furthermore, in the event "laminating" is seen to require curing the thermoset resin and the circuit board of claim 23 cannot be used in the multilayer circuit board of claim 51, it is noted claim 23 forms a single sided circuit board while claim 51 forms a multilayer circuit board wherein claims 23 and 51 disclose patentably distinct species wherein the species of claim 23 was previously examined.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 51-57 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 103

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any

Art Unit: 1733

evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 23, 25, 32, 40, 41, and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson (U.S. Patent 4,747,897) in view of Jones et al. (U.S. Patent 4,697,923).

Johnson is directed to a method of bonding a dielectric material comprising polytetrafluoroethylene (PTFE) to a conductor such as a copper foil by impregnating the dielectric material with a liquid thermosetting resin. Johnson teaches a dielectric material comprising a fluorocarbon such as PTFE and filler material such as ceramic, glass, metal, carbon, etc. (Column 3, lines 5-16). Johnson teaches a liquid thermosetting resin such as epoxy, polyimide, polyamide, etc. (Column 3, lines 3-5). Johnson teaches coating the dielectric material with the thermosetting resin (Column 6, lines 29-31). The resin fills the interstices within the dielectric material and forms an even coating of resin on the materials surfaces (Column 7, lines 37-41). The coated dielectric material is heated to affect a B-stage cure (Column 4, lines 49-55 and Column 6, lines 32-34), and a dry, resin impregnated dielectric sheet is formed. The sheet is then placed, i.e. provided, between one or two sheets of copper foil (Column 4, lines 59-63 and Column 6, lines 47-53). The bonding occurs through the application of heat (175 °C) and pressure (100-800 PSI) (Column 7, lines 53-58 and Column 8, lines 7-10). The laminate can be

Art Unit: 1733

fabricated into a single or double-sided printed circuit board (Column 4, lines 66-68). It is noted a layer of resin is present on each surface of the dielectric material (bonded or not) after lamination because if the layer were not present the circuit board would delaminate (Figure 8 and Column 8, lines 1-4). Johnson is silent as to including a contrasting dye in the thermosetting resin. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the thermosetting resin taught by Johnson a contrasting dye as was known in the art as shown for example by Jones et al. wherein including a contrasting dye in the resin allows easy visual inspection of the internal circuitry of the circuit board and avoids the damaging effect of ultraviolet light on the circuit board.

Jones et al. is exemplary in the art of a thermoset resin impregnated dielectric layer used to manufacture a circuit board wherein the thermoset resin includes a contrasting dye such that the dye allows easy visual inspection of the internal circuitry of the circuit board and avoids the damaging effect of ultraviolet light on the circuit board (Column 1, lines 26-30 and Column 3, lines 28-52 and 62-66).

7. Claims 35, 36, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson in view of Jones et al. and optionally Abe et al. (U.S. Patent 4,495,017) and JP 02145335.

Johnson and Jones et al. (and their application) are described above in full detail.

Regarding claims 35 and 36, Johnson does not specifically recite a solvent included in the thermosetting resin. However, the resin would intrinsically include a solvent in view of the following: (1) Johnson teaches the thermosetting resin is applied as liquid, i.e. the resin is not applied as a melt and (2) After coating the dielectric material with the liquid thermosetting resin

Johnson teaches the coated dielectric is dried such that if the resin were applied in a melt form there would be no need to dry the coated dielectric, it being noted additional (optional) reference is made to Abe et al. and JP 02145335 to show thermosetting resins applied in the manner described by Johnson included solvent.

Regarding claim 45, Johnson does not specifically recite coating the conductor with the thermosetting resin. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to coat the conductor taught by Johnson with thermosetting resin in addition to impregnating the dielectric layer with thermosetting resin to form a strong bond between the two, it being noted additional (optional) reference is made to JP 02145335 to show coating the conductor with thermosetting resin in addition to impregnating the dielectric layer with thermosetting resin to form a strong bond between the two was known.

Abe et al. teach forming a B-stage prepreg by two processes: (1) a wet process wherein a base material is wet with a resin dissolved in a solvent followed by drying the base material to remove the solvent and form a B-stage prepreg and (2) a dry process wherein a thermosetting resin is applied as a powder or paste to a base material followed by heating to melt the resin and form a B-stage prepreg (Columns 1 and 2). It is noted the process disclosed by Johnson is that of process (1) described by Abe et al. wherein the resin is applied to the base material as a liquid, i.e. wet, and the base is then heated to form a dry B-staged prepreg. JP 02145335 discloses forming a circuit board by coating a conductor layer and a prepreg with thermosetting resin (e.g. epoxy) and solvent, drying to remove the solvent, and laminating the two to form a circuit board having high peel strength (See the abstract).

Art Unit: 1733

8. Claims 24 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson and Jones et al. as applied to claims 23, 25, 32, 40, 41, and 43 above, and further in view of the admitted prior art (Specification pages 1-3 and page 8, lines 10-13).

Regarding claim 24, Johnson and Jones et al. as applied above teach all of the limitations in claim 24 except for a teaching on the specific properties of the dielectric material such as using nonfibrillated PTFE. The admitted prior art is directed to bonding a dielectric material (PTFE matrix) to a conductive layer to form a laminated electrical substrate. The admitted prior art teaches the dielectric material comprises nonfibrillated PTFE and filler particles that are evenly distributed, spherical in shape, and have a diameter of less than 10 microns (Specification pages 1-3 and page 8, lines 10-13). Absent any unexpected results, one of ordinary skill in the art at the time the invention was made reading Johnson and Jones et al. in view of the admitted prior art would have readily appreciated using as the dielectric material taught by Johnson as modified by Jones et al. the dielectric material (i.e. a dielectric material comprising nonfibrillated PTFE and filler particles that are evenly distributed, spherical in shape, and have a diameter of less than 10 microns) suggested by the admitted prior art.

Regarding claim 33, Johnson teaches all of the limitations in claim 33 except for a teaching on forming a chip carrier. As noted in the admitted prior art (Specification pages 1-3) it is known to form chip carriers using a PTFE matrix bonded to a conductive material. One of ordinary skill in the art at the time the invention was made reading Johnson and Jones et al. in view of the admitted prior art would have readily appreciated using the method suggest by Johnson as modified by Jones et al. to form a chip carrier as suggest by the admitted prior art as only the expected results would be achieved.

9. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson and Jones et al. as applied to claims 23, 25, 32, 40, 41, and 43 above, and further in view of either one of Ueno et al. (U.S. Patent 4,765,860) or Kusano et al. (U.S. Patent 5,425,832).

Johnson and Jones et al. as applied above teach all of the limitations in claim 37 except for a teaching on subjecting the PTFE matrix to a plasma process prior to coating. It is well known in the art when bonding a PTFE matrix to a conductive material to first subject the PTFE matrix to a plasma process to provide the PTFE matrix with a hydrophilic surface thereby enhancing adhesion between the PTFE matrix and the conductor as shown for example by Ueno et al. and Kusano et al. One of ordinary skill in the art at the time the invention was made reading Johnson and Jones et al. in view of Ueno et al. and Kusano et al. would have readily appreciated incorporating into the method taught by Johnson as modified by Jones et al. the well known plasma discharge technique shown for example by either one of Ueno et al. or Kusano et al. to provide the PTFE matrix with a hydrophilic surface thus enhancing the adhesion between the PTFE matrix and the conductor.

Ueno et al. are directed to a method for bonding a plastic base to a metal foil using a plastic resin to form a printed circuit board wherein the surface of the base is subjected to a plasma process to enhance the bonding strength between the base and the foil (Column 2, lines 28-35 and 40-45). Ueno et al. teach a plastic base made of polyester, polyimide, or PTFE (Column 3, lines 14-18). The base is subjected to a plasma discharge (Column 3, lines 23-28 and 33-37). The base is then bonded to a metal foil, such as a copper foil, using a thermosetting adhesive (Column 5, lines 4-22), and the bonding occurs under pressure and at room temperature or an elevated temperature (Column 5, lines 23-31). Kusano et al. are directed to bonding a

fluoropolymer sheet to a substrate using an adhesive wherein the sheet is modified by plasma discharge treatment to provide a hydrophilic surface for improving adhesion between the sheet and substrate (Column 1, lines 30-33 and 42-44 and Column 2, lines 10-17). Kusano et al. teach a fluoropolymer sheet comprising PTFE (Column 3, lines 48-50). Kusano et al. teach subjecting the sheet to a plasma discharge to form a hydrophilic surface (Column 6, lines 12-17). Kusano et al. then teach bonding the PTFE sheet to a copper foil using a thermosetting (epoxy) adhesive by well known means such as heating, pressing, and heat pressing (Column 6, lines 18-29 and 66-68 and Column 7, lines 1-3).

10. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Johnson and Jones et al. as applied to claims 23, 25, 32, 40, 41, and 43 above, and further in view of Kodokian (U.S. Patent 5,762,741).

Johnson and Jones et al. teach all of the limitations in claim 49 as applied above except for a teaching on the thermosetting resin including filler materials such as inorganic particles. It would have been obvious to one of ordinary skill in the art at the time the invention was made to include in the thermosetting resin taught by Johnson as modified by Jones et al. conventional reinforcing filler materials such as inorganic particles as was known in the art and shown for example by Kodokian as only the expected results would be achieved. As to the fillers impregnating the fluoropolymer matrix, it is noted the dielectric material and thermosetting resin taught by Johnson as modified by Jones et al. and Kodokian is consistent and in agreement with that claimed and disclosed by applicant such that the thermosetting resin with fillers taught by Johnson as modified by Jones et al. and Kodokian would impregnate the dielectric material in the same way as that taught by applicant, i.e. the solids would not impregnate the dielectric material.

Kodokian is directed to a method for bonding polymeric articles. Kodokian teaches heat and pressure bonding a polymer matrix, such as PTFE and filler material, to a composite layer comprising a conductive material, such as copper, using a thermosetting adhesive that comprises a thermoset and filler material, e.g. organic particles (Column 3, lines 7-8, 11-13, 28-42, 56-58, and 63-67 and Column 7, lines 56-67 and Column 8, lines 1, 4-8, 19-23, 25-28, 66-67 and Column 9, 19-20).

Response to Arguments

11. Applicant's arguments with respect to claims 23-25, 32, 33, 35-37, 40, 41, 43, 45, and 49 have been considered but are moot in view of the new ground(s) of rejection. Regarding dependent claims 24, 25, 32, 33, 35-37, 40, 41, 43, 45, and 49, it is noted these claims have the same limitations as those argued in the appeal brief filed 6/30/03. The rejection of the appealed claims was affirmed in the decision given 2/24/04, and applicant has not advanced any further arguments regarding the dependent claims.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **John L. Goff** whose telephone number is (571) 272-1216. The examiner can normally be reached on M-F (7:15 AM - 3:45 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Blaine Copenheaver can be reached on (571) 272-1156. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



John L. Goff



BLAINE COPENHEAVER
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700